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2010

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Lingling Xu
National University of Singapore, xulingling@nus.edu.sg

Jane Hwee Ling Lim
National University of Singapore, janelimhl@nus.edu.sg

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Understanding Information Rating Intention Based on Ant Foraging Behavior

Lingling Xu
National University of Singapore
xulingling@nus.edu.sg

Jane Hwee Ling Lim
National University of Singapore
janelimhl@nus.edu.sg

ABSTRACT

This study focuses on an understudied topic: What are the factors influencing individual intention to share their information (e.g., news) rating with others in an online community? Drawing on social foraging theory, particularly on ant information sharing behavior, we proposed that information rating intention is affected by four factors: altruistic motives, identification with the community, information quality, and knowledge self-efficacy. The model was tested in the context of news communities, using survey data from 150 subjects. Altruistic motives were found to predict intention for both positive rating and negative rating. In addition, higher positive rating intention was predicted by stronger identification with the community, while higher negative rating intention was predicted by lower information quality and higher knowledge self-efficacy. The findings advance our knowledge about information rating, and provide implications for practitioners of rating systems. The adaptation of foraging theories for information systems research is a promising future research area.

Keywords

Information rating, Social Foraging Theory, Information Foraging, Information sharing, Information seeking, Online communities

INTRODUCTION

With the advent of information technology, it is very common for users to seek, digest, as well as share information with others online. A typical scenario is: you read a news article about 4-day workweek on Inc.com; and you share the news to Digg.com (clicking the "Digg" icon); a summarized article of the news then appears in Digg; an hour later, it becomes the top 10 articles on Digg, as 645 users have read the news and digged (voted for) it. The key technology involved in this scenario is a type of rating system, which allows user to express a *recommend/not recommend* (*like/dislike)* type of opinion about an object they are consuming, reading, or experiencing. This rating system has been adopted by a variety of websites. Besides Digg, websites like Youtube.com, PCWorld.com and Urbandictionary.com allow users to populate or depopulate information pieces by clicking on their "Thumb up" or "Thumb down" icons respectively. Such rating system enables users to quickly share their opinions on an object, with minimal interruption to any other task flow they are involved in. It can benefit other users in a way that, when assessed in aggregate, it quickly provides a sense of the community's opinion of a rated object.

Despite the commercial interest in the rating system, Internet users' attitude towards and intention for the rating remain unknown. For example, there is a debate on Youtube's new "Thumb up/Thumb down" rating system, with both positive and negative responses from the users. Research on electronic word-of-mouth (eWOM) has investigated the motivation for customers to make positive or negative statements online about a product or company (Brown, Barry, Dacin and Gunst, 2005; Hennig-Thurau, Gwinner, Walsh and Gremler, 2004). However, there are few studies directed at user intention for positive and negative ratings, exemplified by the recommend/not recommend rating. This type of rating is unique in two aspects: (1) the object of rating is not restricted to products or companies, but can be any piece of information encountered (e.g., news, or information about how to solve a problem); (2) it is individuals' information sharing behavior during the course of information seeking, and the cost of sharing is minimal (i.e., just a second).

Social foraging theory describes how individual animal foragers communicate and share information about food sites with other foragers in the group (Stephens and Dunlap, 2008). A typical example is ant. Ants tend to share food information with other ants in the same colony when they are searching for food. The literature highlights several factors salient for ants' food information sharing: altruistic behavior (Roces and Nunez, 1993), genetic relatedness (Hamilton, 1963), food quality (Roces and Nunez, 1993), and expertise and skills (Middendorf, Reischile and Schmeck, 2002). Human gather information in a way similar to how animals hunt for food (Pirolli and Card, 1999). And human information foragers are assumed to use perceptual and cognitive mechanisms carried over from the evolution of food foraging adaptations (Carroll, 2003). Therefore, when seeking information on the web, humans might also feel inclined to share what they feel about a good/bad piece of information with others in the community through rating the information. Nevertheless, such an assumption is yet to be validated. Researchers have applied findings from animal foraging behavior to the study of information

foraging (Pirolli, 2007), but they have focused on information browsing and searching, paying little attention to information sharing behavior of individual information seekers.

This study attempts to address this research gap by investigating the antecedents of individuals' information rating intention. It draws insights from social foraging research, particularly research on ant foraging behavior, and proposes that four factors—*altruistic motives*, *identification with the community, information quality* and *knowledge self-efficacy* influence individual *positive rating intention* and *negative rating intention*. The research model was tested in the context of a news community, because news is typical information sought and consumed by information foragers on the web.

LITERATURE REVIEW

Social Foraging Theory and Ant Information Sharing

Social foraging theory is based on foraging theory, which is an approach to understanding animal behavior in food seeking, gathering, and consumption (Pirolli and Card, 1999). While foraging theory focuses on solitary forager, social foraging theory describes how individual foragers communicate and share information about food sites with other foragers in the group (Stephens and Dunlap, 2008). The ant is a representative animal targeted by foraging theories. Food sharing is essential for the survival of ant colonies. Social foraging research highlights several factors. First, ants demonstrate *altruism* in sharing food information (Roces and Nunez, 1993). Second, *genetic relatedness and colony identity* are important motives for ants' altruism (Hamilton, 1963). Third, there is a positive relationship between *food quality* and the motivation to inform other ants of the colony (Roces and Nunez, 1993). Fourth, *expertise and skills* are indispensable for the sharing of food information (Middendorf et al., 2002).

Application of Foraging Theories to Human Information Foraging

Conventional and social foraging theory have been applied and adapted to the study of human information foraging. Pirolli and Card (1999) develops information foraging theory to address how strategies and technologies for information seeking, gathering and consumption are adapted to the flux of information in the environment. It assumes that human information foragers use perceptual and cognitive mechanisms carried over from the evolution of food foraging adaptations (Carroll, 2003). Despite the increasing number of investigations, extant information foraging research has focused on information browsing and information searching. Little has been understood about the determinants of individual information sharing during the course of information seeking, which is a common phenomenon on the web. This study, therefore, investigates such determinants by applying findings about ant food information sharing discussed above. Specifically, we target at understanding individual intention to share information by rating news articles encountered in the news websites.

Sharing by Rating: the Context of News Communities

A lot of news websites (communities) have a rating system, which allows users to give a 1-click positive or negative rating to the news articles they have read online. The news, together with their rating scores, and sometimes ranked based on the aggregated rating scores, will then be visible to all users. Therefore, through rating a piece of news, what a user share is not only opinion on the news, but also the news itself.

RESEARCH MODEL AND HYPOTHESES

As mechanisms for community members' information sharing behavior could be carried over from those for colony ants' food information sharing behavior, issues highlighted in ant foraging research might be relevant to community members' information sharing behavior. Given that this paper focuses on information sharing intention rather than actual sharing behavior, *perceptual and cognitive constructs* corresponding to the above four *factual constructs* (i.e., based on observations by ant foraging researchers) are identified and then linked to information sharing intention, in consistence with the logic that perception and cognition can drive intention. A research model is then developed (Figure 1), proposing that individual positive or negative rating intention for news articles is determined by four factors: (1) altruistic motives; (2) identification with the community; (3) news quality; and (4) knowledge self-efficacy.

Altruistic Motives

Altruistic motives are defined as the community members' desire to enhance the welfare of others at a net welfare loss to oneself (Elster, 2006). Just as ants' food sharing has been attributed to altruism, community members' information sharing intention could be due to altruistic motives. Altruistic motives can consist of two aspects: moral obligation motive and the motive for advancing the virtual community (Yu, Jiang and Chan, 2010). The common ground of the two specific motives is the concern for others, and both are altruistic in nature. We expect that individuals with stronger altruistic motives would have higher intention to rate news articles, positively or negatively, because they desire to make good news visible to other community members, or because they feel they should save others from reading uninformative news. It is hypothesized that:

H1a: Stronger altruistic motives lead to higher positive rating intention.

H1b: Stronger altruistic motives lead to higher negative rating intention.

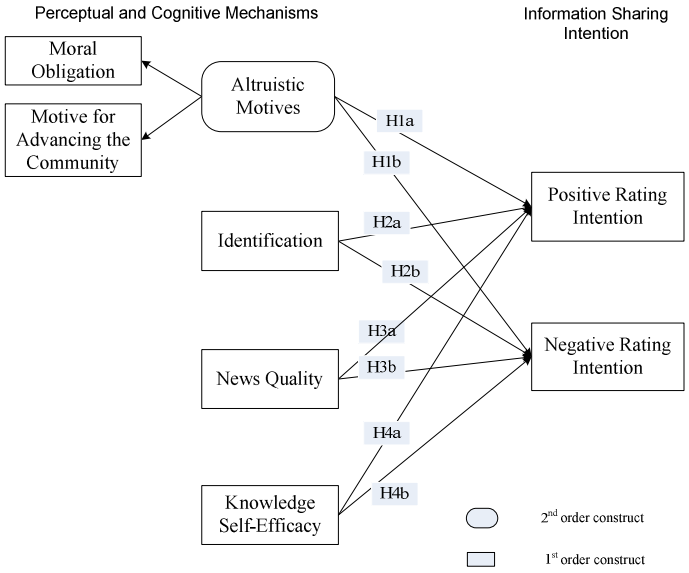

Figure 1. Research Model

Identification with the Community

While genetic relatedness and colony identity are suggested to promote ants' altruistic behavior such as food information sharing, community identity, or more precisely, identification with the community is posited to influence community members' intention for information sharing. Identification with the community is defined as one's perception of similarity of values, membership, and loyalty with the news community (Johnson, Johnson and Heimberg, 1999). The perception of social unity and togetherness of the news community will elevate one's activeness to share their opinions, whether positive or negative, on the news. We hypothesize that:

H2a: Stronger identification with the community leads to higher positive rating intention.

H2b: Stronger identification with the community leads to higher negative rating intention.

News Quality

News quality refers to one's perception of the quality of news articles encountered. In line with the positive relationship between food quality and ants' motivation to inform other ants of the colony (Roces, 1993), we posit a relationship between news quality and community members' intention to share their opinions on the news. Nevertheless, the effect of news quality on positive and negative rating intention is not likely to be the same. When the encountered news articles are perceived as high quality, individuals are more likely to give them positive ratings. On the contrary, when the encountered news articles are perceived as low quality, individuals are more likely to give them negative ratings. We hypothesize:

H3a: Higher quality of encountered news articles leads to higher positive rating intention.

H3b: Lower quality of encountered news articles leads to higher negative rating intention.

Knowledge Self-Efficacy

For ants to share food information with other ants in the colony, they need expertise. In the same vein, for humans to share information with the rest of the community, they need expertise. Furthermore, as humans are more advanced than ants, we have perception of what we can do in our capacity, which is referred to as "self-efficacy". And this self-efficacy perception plays an important role in influencing individuals' motivation and behavior (Bandura, 1977). Therefore, this study is interested in the effect of knowledge self-efficacy on individuals' news rating intention. In a news community, knowledge self-efficacy can be manifested in the form of individuals believing that their shared information can help others in the community, or make a difference to the community. We expect that individuals with high knowledge self-efficacy would be more willing to rate the news articles, either positively or negatively. It is hypothesized that:

H4a: Higher knowledge self-efficacy leads to higher positive rating intention.

H4b: Higher knowledge self-efficacy leads to higher negative rating intention.

METHODOLOGY

Survey method was used to test our model. Instrument for constructs were adapted from prior research. Items for the two dependent variables were adapted from prior measures for intention to share knowledge (Bock, Zmud, Kim and Lee, 2005). Moral obligation and motive for advancing the community was each measured by three items adapted from Yu et al (2010). The two constructs were then used as indicators to create the second-order

construct altruistic motives. Identification and knowledge self-efficacy was each measured by three items adapted from prior studies on knowledge sharing and contribution (Bock et al., 2005; Kankanhalli, Tan and Wei, 2005; Ma and Agarwal, 2007). News quality was measured by four items adapted from Lee et al (2002).

The target community is an Asia-based news website ANews (pseudonym). Subjects were randomly recruited from undergraduate students who have experience with ANews in a large Asian University. The questionnaire was administrated in a reserved room. Upon arrival, the subjects were first introduced to the rating system, and then provided with a scenario that ANews has such a rating system. Finally they filled up a paper questionnaire. The survey took 10 to 15 minutes to complete, and each respondent was paid about US$4. In total, 150 students attended the survey and all completed the questionnaire.

DATA ANALYSIS

PLS (SmartPLS 2.0.M3) was used for data analysis. For first-order constructs, reliability, convergent validity and discriminant validity were evaluated to access their psychometric properties. Reliability was assessed by composite reliability (CR). All CRs exceed the criterion of 0.70, verifying the reliability. Convergent validity was assessed by item loadings and average variance extracted (AVE) for the measures. AVEs are all above the recommended threshold of 0.50. Item loadings are higher than 0.70, except one (0.60), which is close to the recommended cutoff. Hence, convergent validity is acceptable. Discriminant validity was verified by comparing the square root of AVEs with correlations among constructs, and through inspection of the cross-loadings. The square root of the AVE for each construct is greater than the correlations involving the construct. And cross-loadings are not substantial in magnitude compared with the loadings. For the psychometric properties of the second-order construct, CR is greater than 0.70, and AVE is no less than 0.50. In addition, the secondary loadings (i.e., loadings of first-order latent variables on the second-order variable) exceed 0.7. All these provide evidence of reliable measures for the second-order construct.

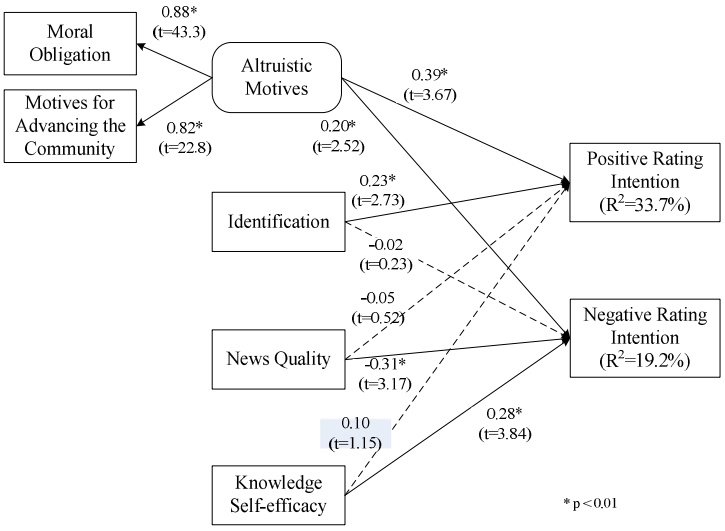

Figure 2. Results of PLS Analysis

Results of hypothesis testing are shown in Figure 2. An R^2 value of 33.7% and 19.2% was obtained for positive rating intention and negative rating intention, respectively. Altruistic motives had a significant effect on both positive rating intention (β=0.39) and negative rating intention (β=0.20), supporting H1a and H1b. Identification had a significant effect on positive rating intention (β=0.23), but not on negative rating intention. Thus, H2a was supported, while H2b was not supported. Furthermore, news quality was not a significant predictor of positive rating intention, but was a significant predictor of negative rating intention (β=-0.31). Thus, H3a was not supported, while H3b was supported. Similarly, knowledge self-efficacy was not a significant predictor of positive rating intention, but was a significant predictor of negative rating intention (β=0.28). Hence, H4a was not supported, while H4b was supported.

DISCUSSIONS

Our results show that altruistic motives significantly predict both positive rating and negative rating intention. Aside from altruistic motives, intention for positive versus negative rating is motivated by different factors. Subjects of stronger identification with the community are more willing to give positive ratings to the news on the website, which is similar to ant food sharing behavior. Subjects who are more confident with their ability to contribute to the community have higher intention to give negative ratings. And lower quality news results in higher intention to give negative ratings.

Our study has several limitations. First, news rating is the focus of this study, and only one news website was involved in the data collection. Whether our findings could be generalized to rating intention for other types of

content (e.g., video) is unclear. Second, this study focuses on a list of independent variables inspired by research on ant food information sharing. Examination of other antecedents, such as the convenience of rating, culture issues, and individual differences is necessary for a more comprehensive understanding of news rating intention.

Despite the limitations, this study contributes to theory development in two ways. Firstly, it advances current knowledge of a particular type of information sharing—give positive or negative ratings to encountered information. Second, it adds to the information foraging literature by demonstrating why individuals intend to share information when they are seeking information. For the prior assumption that information foragers use mechanisms carried over from the evolution of food foraging adaptations, our study services as additional evidence from the perspective of information sharing. Our findings go beyond this by unveiling possible variations in these perceptual and cognitive mechanisms, which are due to the difference between food and information, and between animal survival and online community survival.

It also offers implications for practitioners of rating systems and the news communities. To increase the usage of the rating systems, there are several approaches. First, it is essential to cultivate such belief among community members—it is their duty to help each other and to advance the news community. Second, practitioners of the news community should raise members' identification with the community. This can be achieved by providing email accounts for each member, or awarding credit to members for each rating. The third approach is to enhance members' self-efficacy perception. On one hand, it is important to deliver the message that every member's opinions on the news are a wealth to the community. On the other hand, the rating system should be easy to use.

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